IN THE CLAIMS:

Claim 1. (Cancelled)

Claim 2. (Currently Amended) A method as claimed in claim 13 wherein the [step (b)] sensing comprises [substeps of]:

[b1)] generating and transmitting a laser beam to the structure;

[b2)] receiving [the] a reflected laser beam from the structure;

[b3)] detecting Doppler shift in the received laser beam relative to the transmitted laser beam; and

[b4)] calculating [determining] at least one of [the] a peak displacement and velocity of the vibration, based on the Doppler shift detected [detecting of the substep (b3)].

Claim 3. (Currently Amended) A method as claimed in claim 13 wherein the sensing [of the step (b)] is performed by sensing peak displacement of the vibration from at least one portion of the structure.

Claim 4. (Currently Amended) A method as claimed in claim 13 wherein the sensing [of the step (b)] is performed by sensing peak velocity of the vibration from at least one portion of the structure.

Claim 5. (Currently Amended) A method as claimed in claim 13 wherein the [step (b)] sensing comprises optically sensing vibration from different portions of the structure corresponding to similar elements of the structure, the method further comprising:

[d)] comparing the vibrations from the different portions of the structure; and

wherein the determining [of step (c) performed] is based on the result of the comparing [of the step (d)].

Claim 6. (Currently Amended) A method as claimed in claim 5 wherein the comparing [of the

step (d)] is performed based on peak displacement of the vibrations.

Claim 7. (Currently Amended) A method as claimed in claim 5 wherein the comparing [of the step (d)] is performed based on peak velocity of the vibrations.

Claim 8. (Currently Amended) A method as claimed in claim 13 wherein the sensing [the step (b)] is performed with a laser vibrometer.

Claim 9. (Currently Amended) A method as claimed in claim 13 wherein the sensing [the step (b)] is performed with a Doppler laser vibrometer.

Claim 10. (Currently Amended) A method as claimed in claim 13 wherein the determining [the step (b)] is performed with a computer.

Claims 11-12 (Cancelled)

Claim 13. (Currently Amended) A method [as claimed in claim 1 wherein the step (c) comprises] comprising:

vibrating ground proximate a structure resting on the ground by driving a vehicle over spaced objects to vibrate the structure, the structure being a house or building;

optically sensing vibration from the structure without contacting the structure; and

determining whether a fault exists in the structure, based on the optically-sensed vibration.

Claims 14-23 (Cancelled)

Claim 24. (Currently Amended) A method as claimed in claim 13 wherein the [performance of the step (c)] determining determines that the fault exists in the structure, the fault being damage of a structural element.

Claim 25. (Previously Amended) A method as claimed in claim 24 wherein the structure element comprises at least one of a foundation, roof, ceiling, floor, wall, beam, column, support, joist,

wall panel, wall frame, window, window frame, duct, plumbing, piping, or hangar.

Claim 26. (Currently Amended) A method as claimed in claim 13 wherein the [performance of the step (c)] determining determines that the fault exists in the structure, the fault being deterioration of a structural element.

Claim 27. (Previously Amended) A method as claimed in claim 26 wherein the structure element comprises at least one of a foundation, roof, ceiling, floor, wall, beam, column, support, joist, wall panel, wall frame, window, window frame, duct, plumbing, piping, or hangar.

Claim 28. (Currently Amended) A method as claimed in claim 13 wherein the [performance of the step (c)] determining determines that the fault exists in the structure, the fault being a dislocation or separation between structure elements normally joined.

Claim 29. (Previously Amended) A method as claimed in claim 28 wherein the structure elements each comprise at least one of a foundation, roof, ceiling, floor, wall, beam, column, support, joist, wall panel, wall frame, window, window frame, duct, plumbing, piping, or hangar.

Claim 30. (Currently Amended) A method as claimed in claim 13 wherein the [performance of the step (c)] determining determines that the fault exists in the structure, the fault being an improper joining of structure elements.

Claim 31. (Previously Amended) A method as claimed in claim 30 wherein the structure elements each comprise at least one of a foundation, roof, ceiling, floor, wall, beam, column, support, joist, wall panel, wall frame, window, window frame, duct, plumbing, piping, or hangar.

Claim 32. (Currently Amended) A method comprising [the steps of]:

[a)] first optically sensing vibrations at spaced portions of a structure to produce a first set of vibration data readings;

[b)] establishing base line data from the first set of vibration data readings for respective

spaced portions of the structure;

[c)] at a time after completion [of performance] of the first sensing [of the step (a)], optically sensing vibrations at the spaced portions of the structure to produce a second set of vibration data readings;

[d)] comparing the second set of vibration data readings [of the second set] with the corresponding [vibration data readings of the first set constituting the] base line data to generate comparison result data; [and]

[e)] determining whether a fault exists in the structure at the time of the second sensing [performance of step (c)], based on the comparison result data [of the step (d)]; and

vibrating the structure by driving a vehicle over spaced objects to produce the vibration sensed in at least one of the first or second sensing.

Claim 33. (Currently Amended) A method as claimed in claim 32 wherein the [step (a)] first sensing comprised [substeps of]:

[a1)] generating a laser beam and transmitting the laser beam to the structure;

[a2)] receiving the laser beam from the structure, the received laser beam shifted in phase relative to the transmitted laser beam due to vibration of the structure;

[a3)] detecting the phase shift in the received laser beam; and

[a4)] determing at least one of the peak displacement and velocity of the vibration, based on the detecting [of the substep (a3)].

Claim 34. (Currently Amended) A method as claimed in claim 32 wherein the [step (c)] second sensing comprised [substeps of]:

[c1)] generating a laser beam and transmitting the laser beam to the structure;

[c2)] receiving the laser beam from the structure, the received laser beam shifted in phase

relative to the transmitted laser beam due to vibration of the structure;

[c3)] detecting the phase shift in the received laser beam; and

[c4)] determing at least one of the peak displacement and velocity of the vibration, based on the detecting [of the substep (c3)].

Claim 35. (Currently Amended) A method as claimed in claim 32 wherein the comparing [of the step (d)] comprises comparing vibration data readings [sensed in the steps (a) and (c)] from different portions of the structure corresponding to similar elements of the structure.

Claim 36. (Currently Amended) A method as claimed in claim 32 wherein the comparing [of the step (b)] is performed based on peak displacement of the vibrations.

Claim 37. (Currently Amended) A method as claimed in claim 32 wherein the comparing [of the step (b)] is performed based on peak velocity of the vibrations.

Claim 38. (Currently Amended) A method as claimed in claim 32 wherein the [step (a)] sensing is performed with a laser vibrometer.

Claim 39. (Currently Amended) A method as claimed in claim 32 wherein the [step (a)] sensing is performed with a Doppler laser vibrometer.

Claim 40. (Currently Amended) A method as claimed in claim 32 wherein the [step (b)] establishing is performed with a computer.

Claim 41. (Currently Amended) A method as claimed in claim 32 wherein the [step (d)] comparing is performed with a computer.

Claim 42. (Currently Amended) A method as claimed in claim 32 wherein the [step (e)] determining is performed with a computer.

Claims 43-53 (Cancelled)

Claim 54. (Previously Amended) A method as claimed in claim 32 wherein the structure is a

building.

Claim 55. (Previously Amended) A method as claimed in claim 32 wherein the structure is a house.

Claim 56. (Currently Amended) A method as claimed in claim 32 wherein the [performance of the step (b)] determining determines that the fault exists in the structure, the fault being damage of a structural element.

Claim 57. (Previously Amended) A method as claimed in claim 56 wherein the structure element comprises at least one of a foundation, roof, ceiling, floor, wall, beam, column, support, joist, wall panel, wall frame, window, window frame, duct, plumbing, piping, or hangar.

Claim 58. (Currently Amended) A method as claimed in claim 32 wherein the [performance of the step (b)] determining determines that the fault exists in the structure, and the fault is deterioration of a structural element.

Claim 59. (Previously Amended) A method as claimed in claim 58 wherein the structure element comprises at least one of a foundation, roof, ceiling, floor, wall, beam, column, support, joist, wall panel, wall frame, window, window frame, duct, plumbing, piping, or hangar.

Claim 60. (Currently Amended) A method as claimed in claim 32 wherein the [performance of the step (b)] determining determines that the fault exists in the structure, and the fault is a dislocation or separation between structure elements normally joined.

Claim 61. (Previously Amended) A method as claimed in claim 60 wherein the structure elements each comprise at least one of a foundation, roof, ceiling, floor, wall, beam, column, support, joist, wall panel, wall frame, window, window frame, duct, plumbing, piping, or hangar.

Claim 62. (Currently Amended) A method as claimed in claim 32 wherein the [performance of the step (b)] determining determines that the fault exists in the structure, and the fault is an

improper joining of structure elements.

Claim 63. (Previously Amended) A method as claimed in claim 62 wherein the structure elements each comprise at least one of a foundation, roof, ceiling, floor, wall, beam, column, support, joist, wall panel, wall frame, window, window frame, duct, plumbing, piping, or hangar.

Claim 64. (Currently Amended) A system for detecting a fault in a structure, the system for use with a remote computer and a network, [the system] comprising:

an optical vibration sensor (OVS) comprising an optical element coupled to a laser/sensor head, the OVS positioned in proximity to the structure, the OVS optically sensing vibration of the structure, the OVS generating an OVS signal based on the sensed vibration from the structure, the OVS signal indicating whether the fault exists in the structure; and

a computer coupled to receive the OVS signal, the computer determining whether a fault exists in the structure based on the OVS signal, the computer generating a computer signal indicating whether the fault exists in the structure, the computer coupled to supply the computer signal indicating whether [a] the fault exists in the structure to the remote computer via the network.

Claim 65. (Currently Amended) A system as claimed in claim 64 wherein the computer [is coupled to receive the OVS signal, the computer] generates[ing] a display based on the OVS signal, the display used by a human user to determine whether [a] the fault exists in the structure.

Claim 66. (Cancelled)

Claim 67. (Currently Amended) A system as claimed in claim 64 wherein the computer generates the computer signal [to indicate that a fault exists in the structure] if the [computer] OVS signal indicates that a peak displacement of the vibration at a portion of the structure[,] exceeds threshold amount data stored in the computer.

Claim 68. (Currently Amended) A system as claimed in claim 64 wherein the computer generates the computer signal [to indicate that a fault exists in the structure] if the [computer determines that the] OVS signal indicates that a peak velocity of the vibration at a portion of the structure[,] exceeds threshold amount data stored in the computer.

Claim 69. (Currently Amended) A system as claimed in claim 64 wherein the computer stores the OVS signal having vibration data for different portions of the structure, the computer determining whether [a] the fault exists in the structure by comparing vibration data for similar structure elements to determine if there is a difference in the vibration data of similar structure elements, the computer determining that [a] the fault exists in the structure if the difference between vibration data from similar structure elements exceeds threshold data stored in the computer.

Claim 70. (Currently Amended) A system as claimed in claim 64 wherein the OVS [generates the OVS signal in a first performance of optical sensing to] establishes baseline data including vibration data readings at spaced portions over the structure, and generates the OVS signal at a second, subsequent time [performance of the optical sensing] to generate after-acquired data including vibration data readings at the spaced portions over the structure, and the computer determin[ing]es [a] the fault [to] exists in the structure if the difference between the after-acquired data and the baseline data exceeds threshold data stored in the computer.

Claim 71. (Original) A system as claimed in claim 64 further comprising:

an output device coupled to the computer, the output device generating a printed document, based on the computer signal.

Claim 72. (Currently Amended) A system as claimed in claim 64 wherein the computer comprises a drive unit for writing data indicating whether [a] the fault exists in the structure onto

a computer readable-medium, based on the computer signal.

Claim 73. (Cancelled)

Claim 74. (Currently Amended) A system as claimed in claim 64 further comprising:

an OVS controller (OVCS) coupled to receive the signal from the OVS, the OVSC generating a [vibrating] signal indicating vibration displacement of at least one portion of the structure, the OVSC coupled to supply the [vibration] signal indicating the vibration displacement to the computer as the OVS signal.

Claim 75. (Previously Amended) A system as claimed in claim 64 further comprising:

an OVS controller (OVCS) coupled to receive the signal from the OVS, the OVSC generating a signal indicating vibration velocity of at least one portion of the structure, the OVSC coupled to supply the signal indicating the vibration velocity to the computer as the OVS signal.

Claim 76. (Previously Amended) A system as claimed in claim 75 wherein the OVSC is coupled to the OVS, and is operable to automatically focus the OVS on the structure.

Claim 77. (Currently Amended) A system as claimed in claim [65] 64 further comprising:

a tripod coupled to the OVS[, the tripod] for positioning and supporting the OVS in relation to the structure.

Claim 78. (Currently Amended) A system as claimed in claim [65] 64 further comprising:

a pas/tilt head coupled to the OVS[,] for aligning the OVS relative to the structure.

Claim 79. (Original) A system as claimed in claim 78 further comprising:

a position controller coupled to the pan/tilt head, the position controller controllable to generate a position signal supplied to the pan/tilt head to control alignment of the OVS relative to the structure.

Claim 80. (Original) A system as claimed in claim 79 further comprising:

a computer coupled to the position controller, the computer generating a position control signal supplied to the position controller, the position controller generating the position signal based on the position control signal.

Claims 81-82 (Cancelled)

Claim 83. (Currently Amended) A system as claimed in claim [82] 64 wherein the optical element is a filter.

Claim 84. (Currently Amended) A system as claimed in claim [82] 64 wherein the optical element is a lens.

Claim 85. (Currently Amended) A system as claimed in claim [81] 64 wherein the OVS further comprises a scan unit for scanning a laser beam generated by the laser/sensor head over different portions of the structure, and for receiving the scanned laser beam from the different portions of the structure.

Claim 86. (Original) A system as claimed in claim 64 further comprising:

a vibration generator positioned in proximity to the structure, the vibration generator producing vibrations that travel to and vibrate the structure.

Claim 87. (Original) A system as claimed in claim 86 wherein the vibration generator comprises a vehicle and spaced objects, the vehicle driving over the spaced objects to vibrate the ground in proximity to the structure, to in turn vibrate the structure.

Claim 88. (Original) A system as claimed in claim 86 wherein the vibration generator comprises a ground vibrator that vibrates the ground in proximity to the structure, to in turn vibrate the structure.

Claim 89. (Original) A system as claimed in claim 86 wherein the vibration generator comprises

a speaker generating sonic waves in proximity to the structure.

Claim 90. (Original) A system as claimed in claim 86 wherein the vibration generator comprises an explosive detonated in proximity to the structure to produce a shock wave to vibrate the structure.

Claim 91. (Original) A system as claimed in claim 86 wherein the vibration generator comprises a helicopter generating noise, the helicopter flown in proximity to the structure to vibrate the structure with the noise generated by the helicopter.

Claim 92. (Original) A system as claimed in claim 86 wherein the vibration generator applies direct force to the structure.

Claim 93. (Original) A system as claimed in claim 92 wherein the vibration generator is a vehicle driven to bump and vibrate the structure.